

AJAIYEGBA OYINKAN ELOHO

16/ENG06/006

MECHANICAL

ENG 382 ASSIGNMENT

ASSIGNMENT 2



Ajaiyeba Oyinkan Eloho
16/ENG06/006
ENG 382 Assignment
Mechanical
Assignment 2.

Solution

$x = 0.5$

$$f(x) = e^{-0.5x}(4-x) - 2 \quad f'(x) = e^{-0.5x}(4-x) - 2$$
$$f'(x) = -0.5e^{-0.5x}(4-x) - e^{-0.5x}$$

$x_0 = 0.5 \quad i = 0$

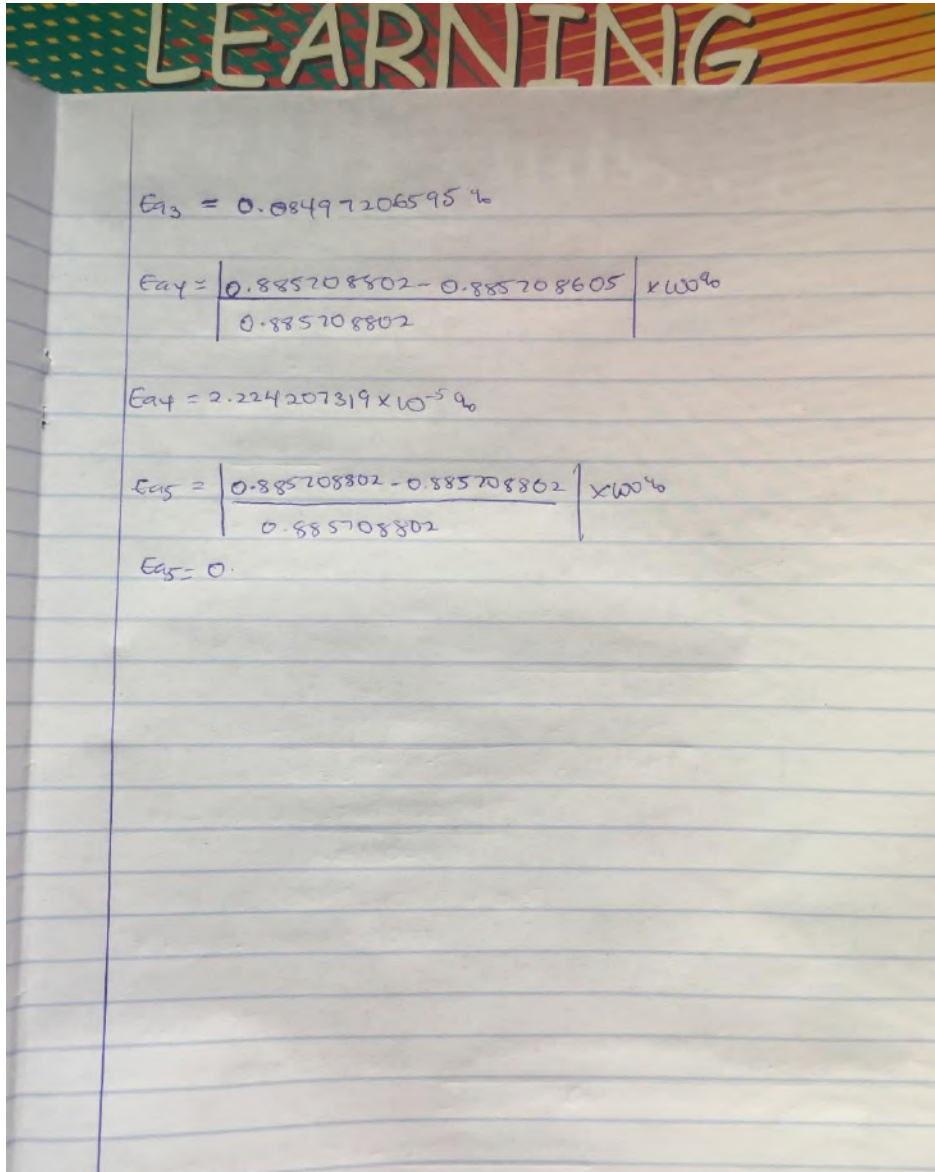
$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)} = x_0 - \frac{e^{-0.5x_0}(4-x_0) - 2}{-0.5e^{-0.5x_0}(4-x_0) - e^{-0.5x_0}}$$
$$x_1 = 0.5 - \frac{e^{-0.5(0.5)}(4-0.5) - 2}{-0.5e^{-0.5(0.5)}(4-0.5) - e^{-0.5(0.5)}}$$
$$x_1 = 0.5 - \frac{-0.7258027407}{-2.141702158}$$
$$x_1 = 0.3388906053 + 0.5$$
$$x_1 = 0.8388906053$$

$i = 1$

$$x_{i+1} = 0.8388906053 - \frac{e^{-0.5(0.8388906053)}(4-0.8388906053) - 2}{-0.5e^{-0.5(0.8388906053)}(4-0.8388906053) - e^{-0.5(0.8388906053)}}$$
$$x_2 = 0.8388906053 - \frac{0.07814929913}{-1.696486038}$$
$$x_2 = 0.8388906053 + 0.04606539481$$
$$x_2 = 0.8849560001$$

$i = 2$

$$x_{i+1} = 0.8849560001 - \frac{e^{-0.5(0.8849560001)}(4-0.8849560001) - 2}{-0.5e^{-0.5(0.8849560001)}(4-0.8849560001) - e^{-0.5(0.8849560001)}}$$
$$x_3 = 0.8849560001 - \frac{7.236575519 \times 10^{-3}}{-1.643060762}$$



MATLAB CODE

```
function [x1, err, relerr] = matass2(x0, imax, tol, iter, f, fprime)
x0=0.5;
imax=100;
tol=0.00000000005;
iter=1;
f=@(x)exp(-0.5*x)*(4-x)-2;
fprime=@(x)-0.5*exp(-0.5*x)*(4-x)-exp(-0.5*x);
for i=1:imax
    x1=x0-feval(f,x0)/feval(fprime,x0)
    err=abs(x1-x0);relerr=abs(x1-x0)/x1
    fprintf('%2.0f %10.10f % 10.10f % 10.10f %10.10f\n',
iter,x0,x1,err,relerr)
    x0=x1,iter=1+iter;
    if err<=tol,
        break
    end
end
```

end
end

matass2

x1 =

0.83889

relerr =

0.40397

1 0.5000000000 0.8388906060 0.3388906060 0.4039747300

x0 =

0.83889

x1 =

0.88496

relerr =

0.052054

2 0.8388906060 0.8849560003 0.0460653942 0.0520538809

x0 =

0.88496

x1 =

0.88571

relerr =

0.00084972

3 0.8849560003 0.8857086050 0.0007526047 0.0008497204

x0 =

0.88571

x1 =

0.88571

relerr =

2.2247e-07

4 0.8857086050 0.8857088020 0.0000001970 0.0000002225

x0 =

0.88571

x1 =

0.88571

relerr =

1.5293e-14

5 0.8857088020 0.8857088020 0.0000000000 0.0000000000

x0 =

0.88571

ans =

0.88571

>> matass2

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